Exploring municipal options for a greener Alberta

A Staff Report
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Foreword

This paper was prepared to compile information on what municipalities have done to help their communities be more in harmony with the environment. Examples appear from Europe, the United States, and Canada. When Albertans are considering what is possible for municipalities, we must recognize the realities of the climate and other circumstances that make the province unique. But these ought not to be viewed as constraints, and certainly not excuses for inertia. Rather, they are simply additional factors that need to be built into the new paradigm we are constructing about our relationship with the environment.

In the past, we have tended to disregard the influences of climate in particular, perhaps with the idea that if we ignore it, it won't be a problem. To a large extent the same can be said of our views about energy. Virtually all communities in North America were built on the assumption that fossil fuels would be cheap and plentiful forever. As everyone knows, this simply isn't so. But we have yet to acknowledge this in the way we design our human settlements.

Municipalities have considerable influence over the way we use and manage natural resources within our communities. Like other institutions, they are becoming increasingly aware of the problems facing humanity if we as a species don't become more accountable and more responsible for our behavior. Progress is being made, although it has been said that when one is at the edge of an abyss, progress is taking a step back. There are many, especially in large urban places, who would like to take one step back, to view progress as technology and resources put to use in ways that contribute to improving quality of life, rather than solely to increase the standard of living. The result would be communities that are more human, more humane, and, in all likelihood, more sustainable. Can we do it? The examples presented in this paper suggest that we can surely do better.

About This Paper

Local government, urban and rural municipalities alike, is responsible for a host of services which are crucial to the continued health and well-being of Albertans. Some of these areas are examined in this paper, specifically land and natural resource stewardship; transportation; water; and municipal operations. The focus of the paper is to identify creative approaches in these areas that (a) do not rely on legislation to be effective, and (b) are not costly for municipalities.

Thus, environmentally related topics which tend to be dealt with through municipal bylaws or provincial legislation (such as noise, public health, and waste disposal) are not covered in this paper. It should be noted, however, that the judicious use of bylaws can be quite effective, and there is considerable leeway in Alberta for municipal governments to choose this route when necessary.

The areas of waste management and nontransportation use of energy, which are very important for municipalities, are also the subjects of a wide range of current literature. A great deal of information is available on recycling programs, packaging, energy conservation, retrofitting, and so on. Readers interested in these two large areas are encouraged to consult the Energy Conservation Branch of Alberta Energy and the Recycling Branch of Alberta Environment, as well as public libraries and environmental groups. A sample of sources is listed in the Appendix.

Acknowledgements

The trend toward decentralization of decision making is one that is likely to continue into the next millenium. It is natural that local government should take a more active role in shaping the future of our communities and society as a whole, because it is closest to the people it represents. Municipal decisions influence many of our day-to-day activities and the services we take for granted.

Local government also has an important role to play in the area of environmental protection and conservation. To varying degrees, municipalities in Canada and around the world are putting into place the phrase *think globally, act locally*. This is an exciting time to be part of the local decision-making process in Alberta, with pending legislative changes that will make the municipal role even more extensive and challenging. These changes are coming at a time when public interest in the environment is high and the pressures on local government are unlikely to abate.

Local councils, especially in Alberta, have many options at their disposal to help their communities become more environmentally responsible, and this paper describes only a handful. I appreciate the comments from colleagues at the Environment Council who reviewed an early draft, and others at the Council who helped in gathering information and typing parts of this paper. The Council's editor, Elizabeth Aike, made many helpful comments concerning organization and managed the production of the final document under tight deadlines.

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Chapter One

Introduction

The World Commission on Environment and Development (1987), better known as the Brundtland Commission, defined sustainable development in this way: "Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future."

The tendency of human beings to come together in communities has enabled our species to make tremendous intellectual, cultural, and technological advancements. But as we are now realizing and beginning to acknowledge, human settlements can also create enormous environmental disruption. For example, good farmland is paved over, not only removing productive acreage but altering drainage patterns and heat reflectivity. Wildlife habitat is lost, enormous amounts of waste are created, and air and water quality are often diminished.

Environmental protection and conservation make one think of natural resources such as air, water, soil, forests, and wildlife. These resources are often regarded as rural or wild and having no relevance to villages, towns, or cities. Historical views of nature preservation and conservation tend to consider human settlements, and cities in particular, as lost to the natural world and of little concern when it comes to ecosystem protection (Solway 1990). This need not be the case.

At a time when human impacts on the biosphere have become painfully obvious, institutions, individuals, and indeed society as a whole are searching for ways to reduce or reverse these negative impacts. Urban places in Alberta now contain almost 80 percent of the province's population (Alberta Treasury 1990), and include the places where future growth is most likely. It is essential, therefore, that communities become actively involved in environmental protection and sustainable development initiatives.

Some of the most important keys to achieving sustainable communities include (1) more innovative and creative approaches to

problem solving; (2) focusing on causes as well as symptoms; and (3) changing our attitudes and reevaluating our priorities.

Albert Einstein said that the problems we have today cannot be solved by thinking the way we did when we created them. Making incremental changes — tiny course adjustments along the same path — is always easier than stepping back and assessing the overall direction in which we are headed. This approach is often more comfortable than questioning the underlying values that influence the way we look at problems. However, it keeps us in the same mode as when we created our problems, and makes it very difficult to find new solutions.

Creativity and the ability to anticipate the consequences of our actions are two of the most important elements of our humanness, and innovative ideas and different ways of doing business will be important elements of environmental problem solving in the coming decade. Turning some of this creative energy loose in search of solutions at the local level will take us far along the path to sustainability.

Focus on the underlying causes of problems as well as the symptoms is essential if we are to find lasting solutions. Perhaps we should be asking if more roads are really a good idea when we can't seem to fill the potholes in the ones we already have. Or we can look at blue box programs. While these have proven to be very popular in every community in which they have appeared, they are only a stopgap measure; they direct attention away from the first and most important of the three *Rs*, that is, *Reduce*. Only by reducing the amount of material brought into our homes and businesses, will we ever truly resolve the waste management issue.

We're the only species that over and over again has deliberately transformed our surroundings in order to stretch our capacity for understanding and provoke new accomplishments. And our growing and enhanced understanding is our most valuable, and our most vulnerable, inheritance.

Becoming greener and implementing sustainable development begins in our minds, with changes in attitudes and changes in priorities. A fundamental part of this shift in thinking is viewing ourselves and our settlements as *part of* nature, not *apart from* nature. Tony Hiss (1990) argues that "we're the only species that over and over again has deliberately transformed our surroundings in order to stretch our capacity for understanding and provoke new accomplishments. And our growing and enhanced understanding is our most valuable, and our most vulnerable, inheritance" (p. xvi). He

raises a point made by Lewis Mumford in his book *The City in History*, that the experience of being part of the ancient city of Athens exposed citizens to experiences that together and cumulatively produced "not a new type of city, but a new type of man." Have our modern human settlements made us into different kinds of people? Do we accept without question the problems and, some would say, the reduced quality of life associated with living in a community, especially a large one? Do we shape our settlements or do they shape us? In short, how can we influence what we are becoming?

Do we shape our settlements or do they shape us? In short, how can we influence what we are becoming?

Environmental considerations play an important role in moulding a sustainable future for our communities. The term *ecocity* has been used to describe an ecologically healthy city. But it is not necessary for a community to be a city for the same concepts and principles to apply: we can have and we very much need ecotowns and ecovillages too. According to Richard Register (1987) no such city currently exists, although there are bits and pieces scattered about in present-day cities and sprinkled through history. He suggests that in the old European cities and towns and in the Indian pueblos of the American Southwest, we see hints of the ecocity: compact, lively settlements that wasted little land and consumed little energy. There are hints of the ecocity in today's solar, wind, and recycling technologies. In individuals using foot, bike, and public transportation in preference to the car, we get another glimpse of a radically different future. In concern about resource depletion, pollution, overpopulation, and extinction of species, we have a necessary precondition for ecocities: people caring about the future and in many cases, working for it (p.31).

One reason that environmentally responsible attitudes and behavior in urban communities are so important, is the impact they have on the surrounding region; that is, the arm's length impacts of urbanization. For example, the energy demands of cities served by Hydro Quebec have an effect on James Bay; problems finding a new landfill site have been felt far beyond Edmonton's boundaries; and of course urban growth itself has a direct and essentially irreversible impact on adjacent farmland.

Municipalities have a large influence on the day-to-day lives of citizens; local government is close to people and shapes the way our daily needs are met. While municipal government is only one part of a

community, sharing the field with churches, schools, hospitals, cultural and sports organizations, and others (Wight 1990), it has many opportunities to demonstrate environmental leadership as it sets priorities and makes plans. Municipalities also need to support and complement sensible and responsible individual decisions with appropriate and responsible policies. The no-smoking bylaws that are now common in many Alberta municipalities are a good example of public policy supporting healthy decisions by individuals.

Almost everything local government does has an impact on health and the environment. There are many ways to take action and show leadership, and each municipality must consider its own situation and what is suitable for the jurisdiction and its residents. Denis Hayes in his keynote address to the 1990 Ecocity Conference suggests that "What we need is the kind of political courage and creativity involved in sensing what our cities ought to look like if they are to meet the genuine needs we have as people and live within the resource constraints we face" (p. 7). Substitute the word *communities* for *cities* and this powerful statement would lose none of its strength.

Some of the things that municipalities can do to help their communities become more environmentally responsible do cost money, and in times of budgetary restraint, large expenditures may not be possible. But in the planning stages, when local governments are expanding or replacing their infrastructure, some options become feasible, and in the long run, often result in actual savings. In short, there is much that municipalities can do to protect, conserve, and restore the environment. The remainder of this paper examines some of the approaches various municipalities have taken in the areas of land and resource stewardship, transportation, water management, and municipal operations. Not all the options presented here are possible or practical for every Alberta municipality. However, perhaps they will act as catalysts to generate some creative thinking leading to local solutions for local problems.

Chapter Two

Land and Natural Resource Stewardship

- ***design over time***
- ***vernacular versus pedigree landscapes***
- ***natural ground cover***
- ***long-term municipal savings with diverse plant species***
- ***creek restoration***
- ***interjurisdictional initiatives***
- ***tree-care workshops***
- ***master composter projects***
- ***commemorative trees***
- ***shelterbelts***
- ***allotment gardens***
- ***biological pest control***

All municipalities have in their jurisdictions some lands that are, or could be, biologically diverse and appealing places. Wild places with plenty of vegetation serve many interconnected functions, offering a host of benefits to a community: for example, they provide habitat for animals, absorb carbon dioxide from the air, mitigate the heat island effect in summer, supply wild berries such as saskatoons, and control erosion on slopes. The stewardship of these lands and their resources tends to be a municipal responsibility. This requires that local governments determine

(a) how much land and which lands should be left natural or wild;

(b) how much public access is needed and how it should be provided;

(c) what is to be the role of private land; and

(d) how these lands can be managed to maintain their ecological health.

Natural spaces provide urban residents in particular with opportunities to enjoy nature. If a setting is close to where they live, transportation costs and the environmental impacts they cause are minimized. Birdwatching, for instance, is considered to be one of the most rapidly growing leisure activities in North America. Maintaining areas with a diversity of biological features increases the opportunities to view and experience wildlife, opportunities that might otherwise be difficult or impossible for urban dwellers.

Using a diversity of species in public plantings, whether in rural or urban municipalities, has many benefits. The chance of the entire plant community being decimated by pests or diseases is greatly reduced, thus reducing the need for pesticides. Trees can be replaced as individuals mature and die or present a danger to the public. And a diversity of plants usually means a greater diversity of animals too — birds, insects, and in denser plantings, small mammals.

Naturalization and Parks

Communities may find themselves in a situation where much of the original native vegetation has been removed. Naturalization programs can restore many of the benefits offered by vegetation but thoughtful planning is required to do this. Successful programs may also require changes in the way we view the town or city landscape. For example, many communities allocate considerable amounts of time and funds to establishing what have been referred to as *pedigree* landscapes. These often intensive plantings of nonnative species may be attractive, but they also usually require high levels of maintenance.

The design-over-time approach to landscape management is based on natural processes rather than horticultural techniques and involves the encouragement or introduction of natural landscape elements such as woodlands, wetlands, ponds or meadows as productive, self-perpetuating ecosystems.

Hough and Barrett (1987) suggest that communities take a different approach to landscape management, which they call *design over time*. This approach is based on natural processes rather than horticultural techniques and involves the encouragement or introduction of natural landscape elements such as woodlands, wetlands, ponds, or meadows as productive self-perpetuating ecosystems. This can provide many benefits to a municipality faced with increasing costs of maintenance operations on the one hand and decreasing budgets on the other. Savings in energy, materials, and manpower as well as improved environmental health, increased recreation opportunities, and greater aesthetic diversity can result from this approach. Longer-term, formal planning for naturalization, which integrates a community's development plans and anticipates its land use needs, as well as a good knowledge of the appropriate species makes design over time easier.

In 1985 the North York (Ontario) City Council adopted a report from a two-year study on naturalized areas, resulting in major changes in the way the municipality dealt with remnant woodlots, steep

hillsides, and wet areas in the existing local parks system. Adoption of the report gave the administration endorsement to proceed with the naturalization program in 20 specified local park areas in consultation with and through cooperation with local community groups (Granger 1990). Work had been underway in North York for some time to provide pleasant walking trails in a natural setting and there was a lot of public support for these efforts.

Action is also possible on a large, interjurisdictional scale. Recognizing the value of wild and open spaces in meeting peoples' needs, the communities of the Portland-Vancouver region on the Oregon-Washington border are working together to bring into being over the next five to ten years, a major new bistate, four-county, 1,000 square-mile open space initiative — the Metropolitan Greenspaces program. "Metropolitan Greenspaces amplifies the traditional nineteenth-century urban idea of parkland and recreational space by adding on a late twentieth century idea: parks where people and wildlife and native vegetation are equally at home. The region's existing park systems will be more than doubled in size by creating, as an adjunct, the United States' first coordinated urban system of natural areas and wildlife refuges and reserves — linked together by hiking and biking trails and by rivers, streams, and woodland corridors that permit the migration of wildlife throughout areas already urbanized and those about to become urbanized" (Hiss 1991:167).

There are new varieties of grasses available now that grow more slowly, requiring minimal cutting and maintenance, and many native ground covers could also be suitable for planting along roadside verges, especially on steep slopes.

Discontinuous parcels of public and private land in one municipality were the focus of naturalization efforts in the Sudbury area of Ontario. The Regional Municipality of Sudbury, between 1978 and 1987, naturalized over 1500 hectares of public and private open space using a mix of grass and legume species with 14 species of trees, in combinations that vary according to terrain, soil, exposure, and moisture regimes (Hough and Barrett 1987). There are new varieties of grasses available now that grow more slowly, requiring minimal cutting and maintenance, and many native ground covers could also be suitable for planting along roadside verges, especially on steep slopes. This type of proactive approach to landscaping is possible at any time, but municipalities may need to consider the type of expertise and the sort of information they will need to implement such an approach.

The William Curtis Ecological Park, located on a two-acre plot in a rundown industrial area of central London (England), was created in 1977 to show how some of London's large stock of unused land might economically be put to creative use. It was conceived as a study center for London schools, for research and study in urban ecology, and urban wildlife conservation. A pond was constructed and numerous naturalized and native plant communities have been established. Problems have been handled as they arose, and as an experiment in environmental education and an ecological approach to the use of derelict urban sites, this project is a practical example at little cost, but much effort and enthusiasm, of one creative alternative to urban landscape (Hough 1989).

Expanded roles for volunteers in maintaining parks near their home is the basis of Calgary's Adopt-a-Park program. When volunteers look after many of the smaller tasks, Parks staff are then able to attend to jobs that might otherwise be overlooked.

A slightly different but very creative approach being taken in Okotoks, Alberta involves landscaping the grounds of a senior citizens' home, specifically to attract birds and facilitate viewing of these birds. The project has been inspired and directed by community volunteers including naturalists, horticulturists, the mayor, local businesses, service clubs, a few provincial agencies, and of course participation of the seniors themselves has been encouraged.

When the project is completed, residents will have wheelchair access by paved pathways to various feature sites, including butterfly, kitchen, and hummingbird gardens; a water feature bird bath; conversation benches; two gazebos; and raised gardening beds. The project's objective is to encourage outdoor activities with a focus on birdwatching and appreciation of nature.

The outside interests are to be complemented by guest speakers and indoor presentations related to wildlife photography, horticulture, bird and wildflower identification, and record keeping of nest box productivity, first arrivals, and so on. If all goes according to plan, the seniors will be actively involved in the management of these unique grounds and can take pride in a hobby that can be enjoyed by persons of all ages and physical ability (Nette 1991: pers. comm.).

Rights of Way

Municipal rights of way also provide good opportunities to use open space creatively. There will be limitations on utility corridors due to the need for regular access, but other rights of way (such as abandoned rail lines and some sewer lines) offer more flexibility. Thus the ongoing uses of the right of way affect what can be done in terms of naturalization and creating interesting open spaces. Dorney (1990) documents four case studies from communities in Ontario that successfully accomplished ecological restoration of selected rights of way. The resulting landscaping reduced erosion, and with appropriate use of native species required less maintenance.

In Alberta, the Municipal District of Starland's Agricultural Service Board is planning a shelterbelt on undeveloped road allowances. With proper planning, this type of road allowance use has many potential benefits: provision of wildlife habitat, snow trapping on adjacent agricultural lands, and protection for lands susceptible to wind erosion. The municipality also hopes to examine the possibility of replacing snow fencing with permanent tree shelters. If this proposal proves viable, there is an opportunity to replace an annual municipal operation (placement and removal of snow fences to reduce drifting) with a green alternative, which would have financial benefits for the municipality (Stanger 1991; pers. comm.).

The Texas State Highways Department has a success story based on the use of wildflowers along the highway rights of way. As long ago as the 1930s, it was noticed that when land was disturbed, the first thing to come back was the state flower, the bluebonnet (*Lupinus texensis*). Local garden clubs encouraged the highway department to preserve the flowers, so the department hired a landscape architect to work with the clubs. In the 1980s, the department took a look at the prevailing engineering philosophy, of which aesthetics was not normally a part, and decided that there were some good economic arguments for maintaining the wildflower populations. Counties and highway districts became involved and found that mowing costs and revegetation costs due to mowing have been reduced significantly. Other wildflowers suitable to the area are being tested and gradually introduced to the program (Steffens 1990).

Water Bodies and their Borders

Many Alberta communities, founded along rivers, have naturally occurring wild places along river banks and in the ravines. The river valleys are often a major natural feature of a community, of which people are quite proud. A number of Alberta municipalities have worked with the provincial government and nongovernment agencies to protect their river valley environments and make them accessible for nonconsumptive uses. In November 1990, Edmonton City Council accepted an overview of a concept plan for the North Saskatchewan River Valley and Ravine System, which actually extends from Devon to Fort Saskatchewan.

Communities have also taken advantage of the Urban Parks program to ensure access to and use of their river valleys and ravines in an environmentally sound way, among them Grande Prairie, Fort McMurray, Lethbridge, Red Deer, Calgary, and Edmonton. In general, Waskasoo Park in Red Deer is a particularly good example of the positive impact that early and widespread citizen involvement can have on the planning process. The ultimate park design was one that the local residents liked and that met their needs. Consequently, this park and others handled in the same manner are well used and well maintained.

The ultimate park design was one that the local residents liked and that met their needs. Consequently, this park and others handled in the same manner are well used and well maintained.

Big Lake, northwest of Edmonton, is a good example of several local governments working together to protect and sensitively develop an area for recreation and wildlife habitat. Under the auspices of the Edmonton Municipal Regional Planning Commission, the County of Parkland, the Municipal District of Sturgeon, and the cities of Edmonton and St. Albert and other agencies have been working on a plan that gives a high priority to conservation of the lake and its shores. This would provide an excellent and accessible opportunity for outdoor education, waterfowl conservation, and tourist viewing opportunities on the doorstep of two of Alberta's cities.

The Regional Municipality of Waterloo, Ontario in cooperation with various nongovernment organizations has done extensive rehabilitation on Laurel Creek. This program involved many individuals who lived near the creek as well as clubs, youth groups, and service organizations. Severe erosion problems have been curtailed and the

creek, which flows through the countryside near the City of Waterloo, has been largely restored.

An example of creek restoration with a difference is San Luis Obispo Creek in California. The community decided to preserve both a natural creek and a part of its history by developing its Mission Plaza with the creek as an integral part. Businesses were encouraged to open a storefront onto the creek walkway, safety concerns were met, and the plaza was extensively landscaped using native California plants. As well, city council adopted a flood management policy which committed the city to an environmentally sensitive program to protect the creek while reducing the risk of flooding. City council and staff, business people, and citizens were all involved in making this project a success (Hook 1990).

Municipal Horticulture

Trees

The most important value of the urban forest, and the most difficult to quantify, relates to aesthetic enjoyment and psychological well-being — in short, how we perceive our surroundings and the feelings generated by those perceptions.

The value of trees in urban and rural municipalities is not always appreciated or realized. Work done in Athens, Georgia estimated that a $1.46 million to $1.79 million increase in property values was associated with the aggregation of trees in that city; this in turn could be tied to additional tax revenues of about $200,000 (Anderson and Cordell 1985). "The basic environmental and aesthetic values of trees are extremely important but also difficult to quantify, although some attempts have been made...Perhaps the most important value of the urban forest, and the most difficult to quantify, relates to aesthetic enjoyment and psychological well-being — in short, how we perceive our surroundings and the feelings generated by those perceptions" (Reid 1988:10).

There are other, more concrete benefits from trees too. Properly oriented, deciduous trees can shade buildings in summer and let in warmth in winter, reducing air conditioning and heating bills respectively. Trees can have a substantial impact on carbon dioxide emissions, which contribute to global climate change, in two ways; first, like other plants, they absorb carbon dioxide in the process of photosynthesis, and second, their shade means that less energy is

consumed for air conditioning. For example, "In the case of well insulated homes in Chicago, going from no trees to three trees per house (two on south side, one on west side) is estimated to reduce peak air conditioning load by 24 percent and mean annual air conditioning load by 8 percent. Values for Minneapolis are 29 percent and 14 percent respectively. The greatest benefits of planting more trees would accrue 20-30 years from now and later, at which time summers are projected to be noticeably warmer. Hence urban tree planting can be viewed as a measure taken in anticipation of future warming, rather than as something being particularly effective in reducing the current rate of warming" (City of Toronto 1989:30).

Trees can have a substantial impact on carbon dioxide emissions, which contribute to global climate change, in two ways; first, like other plants, they absorb carbon dioxide in the process of photo-synthesis, and second, their shade means that less energy is consumed for air conditioning.

The area of urban forestry is gaining ground in forestry schools, and municipalities that are interested in establishing or maintaining community trees have been bringing such professionals onto their staffs to work with planners, landscape architects, and others. In the 1970s and 1980s it became apparent to some of the citizens and local politicians in Kalispell, Montana (population 11,000) that their city was in danger of losing many of the mature trees that contributed so much to the beauty of the community. In 1986, council passed the Kalispell Tree Ordinance which had as its purpose (1) regulating public trees within the City of Kalispell; (2) to provide for their planting, protection, maintenance and removal; (3) establishment of a tree commission, and (4) delegation to the Director of Parks and Recreation the duty of assuring orderly development of public trees (City of Kalispell, Ordinance 1086).

The Kalispell Street Tree Commission (KSTC) planned a strategy to identify problems related to tree management and maintenance, develop an inventory of street trees, and gain public understanding and support for a long-term program. Working with the city and property owners, efforts by the KSTC will improve the vigor and diversity of Kalispell's trees and help ensure a healthy urban forest for some time to come. A number of neighborhoods have worked with the KSTC to maintain the street trees. The local council continues to be receptive to the commission's advice, as evidenced by an increased budget allocation to $30,000 and plantings of over 300 trees during the last few years (Baker 1991; pers. comm.).

Montana also has an extensive state urban forestry program, initiated in the 1970s to encourage efficient short- and long-term management of community street and park trees. In Denton, Montana, a small agricultural community, the local garden club took the initiative to sponsor several tree-care workshops and a sick-tree clinic, and, with professional assistance, develop a comprehensive plan to manage the town's 400 trees (Walkowiak 1988).

In Alberta, 1993 will mark the centenary of Edmonton's Arbor Day celebration, and many Alberta communities are becoming more interested in Arbor Day activities. Tree plantings also have been organized in association with other celebrations such as Forestry Week in May and Environment Week in June. Tree planting is often part of downtown revitalization and overall beautification projects such as that being undertaken by the Town of Sexsmith (McRae 1991).

An idea which is proving to be popular in some Canadian communities is commemorative trees. Dartmouth, Nova Scotia encourages the planting of trees in conjunction with a special event such as a birth, marriage, death, or golden anniversary. For a cost of $200 the City will plant a tree with a plaque identifying the event. Sherbrooke, Quebec has a similar program, and this year the City of Regina, Saskatchewan planted sweetheart trees for those who wanted to remember a special person on Valentine's Day. For $59.95 the City would plant the tree, with a plaque at the tree base, and send the recipient of the honor a certificate noting the tree type and location. In Calgary, the large poplar trees along Memorial Drive were actually planted in memory of those who died in World War I.

Gardening

For many people, the concept of a garden implies beautiful landscaping with masses of colorful blooms; for others, the vision of a perennial country garden springs to mind; and for still others, a garden can only mean a bounty of fresh vegetables. Gardens can make an important contribution to maintaining biological diversity and keeping our communities attractive: the flowers and seeds attract various insects and birds which can assist in controlling pests, and more and more gardeners are experimenting with heritage seeds and preservation of the other older varieties of flowers and vegetables.

Flowers are often a great source of relaxation and pleasure for many people. The rise of what Hough (1989) calls *vernacular* landscapes may become more common as costs for managing the more traditional pedigree landscapes rise. As well, the use of wildflowers and other plants that are well adapted to local growing conditions seems to be an increasingly popular and economical approach to gardening for aesthetic purposes.

Not only are gardens attractive, they can also be a source of nutritious, inexpensive food. While current consumption and distribution patterns for fruit and vegetables enable us to enjoy a wide variety of food, they have also made us very reliant on large, low cost supplies of fossil fuels. The availability of cheap energy has enabled farmers to grow more with less labor and has allowed affordable imports of food from faraway places. This increasing reliance on fossil fuels has environmental effects and makes populations vulnerable when it comes to food supplies. One approach to lowering these risks is to produce more food where people live.

Increasing reliance on fossil fuels has environmental effects and makes populations vulnerable when it comes to food supplies.

Towns and cities have significant potential for food production, and utilizing this potential has at least three immediate practical benefits:

- backyard or community gardens are close to users which reduces fuel expenditures and food costs
- small scale gardening encourages increased use of sustainable techniques (fewer fertilizers and pesticides)
- proximity of production to end-use eases recycling of organic wastes through backyard or community composting and reduces the need for land fills.

Urban Approaches to Gardening

Michael Hough (1989) illustrates what can be accomplished with small scale gardening when the necessary motivation is present. In 1943, for example, citizens in Vancouver, B.C., urged by the government to plant a wartime garden and aided by a City decision to rent vacant land at a nominal fee, produced some 31,000 tons of fresh vegetables and fruit

— the equivalent to $20 million worth of supermarket produce at 1979 prices.

Municipalities have pursued more recent initiatives to help those who may not have access to their own land but who wish to garden, either on their own or as part of a group. The demand for allotment gardens, especially in or near cities, has been growing rapidly in the last ten to fifteen years, particularly among those who live in apartments or in locations where open space is at a premium (Hough 1989). Allotment gardens, in which people are allowed to work a piece of land, usually for a small fee, are common in many places in Europe. As of 1987 (Hough and Barrett), Toronto had 14 sites used for this purpose, providing a total of 2,060 plots; demand is high and waiting lists are common. Ottawa has also had some experience with allotment gardens.

Sponsored community gardening is another option for municipalities that wish to encourage urban food production. It is "based on the notion that an urban community can share in the work, costs and benefits of producing food. The concept is well developed in many cities in the U.S. and in Great Britain, particularly in areas where poverty, unemployment and poor nutrition are widespread. In the United States, the Department of Agriculture funds community gardens in low-income areas of the major cities, and in England the Inter-Action Advisory Service has sponsored similar programs in some 50 cities" (Hough and Barrett 1987:58). Seattle's *Pea Patch* was launched in 1973 when workers transformed ten rubble-strewn lots into vegetable gardens. Now this citywide community program has grown to include 24 sites covering 13 acres. In 1989, volunteer gardeners donated more than eight tons of fresh produce to Seattle's food bank for free distribution to low-income people" (Kour 1990:25).

In Toronto, the Regent Park community garden has shown both practical and social benefits that come from food-producing activities. "By taking control over one aspect of their lives — food — the community has generalized such experience to address further problems in a constructive manner" (Brule 1986:27-28). Municipalities can support such endeavors by keeping the rent on such lands low and, if the land is earmarked for future development, assist the gardeners in finding new property.

Rooftop and balcony gardens also have potential as food producing spaces. At McGill University, a community garden project was undertaken in 1975 using a community center roof in downtown Montreal. The study concluded after two years that the use of rooftops for productive purposes is realistic and practical in situations where little space is available at ground level (Hough 1989).

Farmers' Markets are well-established and highly popular in dozens of Alberta's urban and rural communities. With markets close at hand, growers can keep good farmland in production and have a viable operation on even a relatively small parcel of land. Produce is fresher and transportation impacts are greatly reduced when consumers have access to locally-grown food.

Recycling Waste Materials

Wastes generated by human settlements offer great potential for food production.

Finding and capitalizing on opportunities to use so-called wastes generated by human settlements offers great potential for food production. Waste heat, wastewater, and waste organic material (leaves, grass clippings, sewage) are all potential resources that could be used to produce food and other crops in urban or adjacent rural areas.

Innovations in the use of wastewater offer further examples of how the potential of waste materials can be exploited. For example, since 1973, Muskegon County in Michigan has recycled 43 million gallons of secondary treated domestic wastewater by applying it on 10,300 acres of formerly unproductive land (Goldstein 1977). The average yield of corn grown on this land in 1975 was about 90 percent of the yield possible on operating farmland. Furthermore, the cost of the water treatment system, including the land, was reported to be about one-sixth of the cost of similarly sized waste treatment plants (Hough 1989). (See discussion of wastewater disposal in Chapter Four.)

Home composting information distributed through master composter programs, such as those offered in Toronto, Seattle, and soon to be offered in Edmonton, offers a means for municipalities to help exploit the potential productivity of waste materials from human settlements.

Pest Management

Reducing the use of chemicals to control weeds and pests in community open spaces is something that a number of municipalities are considering. In 1987 the City of Red Deer opted for a mosquito control program based on biological rather than chemical means. The success of this program relied to a large extent on the fact that the ecosystems in and around Red Deer were strong and healthy, providing a source of natural predators. The program was thoroughly tested in 1990 when heavy rains required six full applications of the biological control agent *Bacillus thuringiensis israelensis;* nevertheless, a documented mortality rate of 85 percent of mosquito larvae was achieved using no chemical applications. The 1990 budget for the program was $91,270, with about 46.6 percent being recovered from the province's Biting Fly Assistance program, and approximately 46.3 percent from the City of Red Deer (a cost of about 75 cents per resident of Red Deer). Parkland Industries of Red Deer contributed 7.1 percent of program costs in 1990 (Moir 1990). This budget includes pest monitoring and mapping as well as application of the mosquito control agent. The control program has been so successful that the City of Red Deer has now established a Biological Services section within the Parks Department to look at biological approaches to controlling other pests.

When it comes to using lawn and garden chemicals, urban consumers exceed agricultural users by several times on a per acre basis. A large amount of these chemicals is improperly and inefficiently applied, reducing their effectiveness and increasing the pesticide loading in the environment. Plants are very resilient, and if they are properly cared for in other ways (e.g. adequate water, light, and so on), they can tolerate a surprising amount of pest damage. Furthermore, municipalities could save money in the long term by planting resistant species and by planting a diversity of species. A boulevard of mixed trees, for example, is much less likely to be decimated by pests or disease than a tree monoculture. Gilkeson (1990) describes a variety of approaches to integrated pest management, for which an open mind and willingness to experiment are probably the most important conditions for success.

Municipalities could save money in the long term by planting resistant species and by planting a diversity of species.

Soil Conservation

Almost all rural municipalities in Alberta have established Agricultural Service Boards (ASBs), which are charged with soil conservation, weed control, roadside seeding, and other responsibilities. ASBs have long been instrumental in land stewardship and soil conservation, working with the province, producer organizations, and others at the local level. Recent programs such as the Canada-Alberta Soil Conservation Initiative (CASCI) have made additional funds available to the service boards to promote and demonstrate soil conservation practices, including the use of field shelterbelts and permanent cover. Dozens of counties, municipal districts, and improvement districts in Alberta have participated in CASCI, with concerns focusing on control of wind and water erosion, salinity, organic matter content, and moisture management. Activities include courses, demonstrations, tours, planning and awareness, and some areas have also received funds to purchase conservation equipment (Agriculture Canada and Alberta Agriculture 1990).

Chapter Three

Managing The Impacts of the Automobile

- ***proximity of work, housing, recreation***
- ***focus on moving people, not just vehicles***
- ***public transportation***
- ***clearway programs***
- ***parking rates***
- ***bicycle lanes***
- ***bike-and-ride programs***
- ***synchronized traffic lights***

Transportation is a critical factor in the efficient functioning and well-being of a community, and decisions about how people move around communities affect everyone. But, looking at the bigger picture, we see that decisions about how we move people and goods affect almost every other way land is used. At this stage in the history of North American communities, knowledgeable people have recognized that the automobile, or perhaps more precisely cheap energy, is the factor that has contributed most to the problems plaguing human settlements.

Richard Register (1987:31) put it this way: "The automobile is without question the most destructive agent of social disintegration, ecological contamination, poisoning of people and environment, waste of energy, and even homicide (outstripping violent crime by more than two to one). More accurately, it [the problem facing human settlements since the age of the automobile] is the interrelation of automobiles and sprawling, generally single-use and low-density land-use patterns: Auto Sprawl Syndrome."

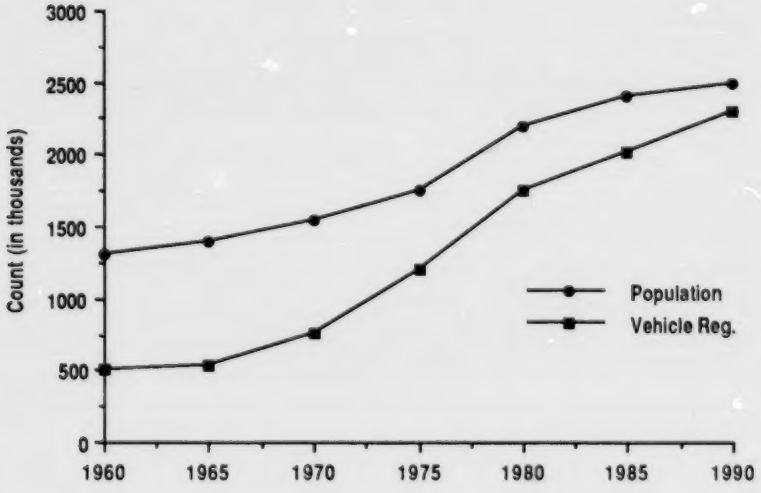
Designing communities around the private vehicle has in the past divided neighborhoods; fragmented natural features; increased noise levels; generated urban sprawl with concomitant infrastructure needs and expenditures for water, sewage, power, and gas; resulted in increased air pollution and, until recently, higher lead levels in urban places; altered drainage and runoff patterns; and, increased solar absorption creating heat island effects. The common use of service roads to segregate traffic, especially in many rural municipalities is also destructive. It sterilizes vast areas of land, increases the costs and environmental impact of road building and maintenance, and creates dangerous intersections. These examples of catering to the demands

of a society reliant on the private vehicle demonstrate the ineffectiveness of the incremental approach to problem solving (described in Chapter One).

Especially in urban centers, as more individuals acquired their own transportation (see Figure 1), neighborhood facilities and services began to decline. People no longer needed to work, shop, or recreate near where they lived, and demands for more and better roads grew. Promoting more creative land use and development patterns with a mix of uses — that is, locating office, retail, recreation, and housing facilities in close proximity to each other — would alleviate some of these problems, and may indeed become more common.

Worldwide, motor vehicles are playing an increasing role in global climate change and air pollution. As large consumers of fossil fuel, they are major sources of carbon dioxide (CO_2), volatile organic compounds (VOCs), oxides of nitrogen (NO_x), carbon monoxide (CO), and chlorofluorocarbons (CFCs). Virtually the entire global motor vehicle fleet runs on fossil fuels, mainly oil. "For every gallon of oil consumed by a motor vehicle, about 19 pounds of CO_2 (containing about 5.3 pounds of carbon) go directly into the atmosphere [direct tail pipe emissions only]. In other words, for every 15 gallon fill up, about 300 pounds of CO_2 are eventually released into the atmosphere" (MacKenzie and Walsh 1990:7).

Figure 1: Vehicle Registration & Population Trends 1960 to 1990



Source: Adapted from Alberta Motor Vehicles Division 1990

Another factor that has contributed enormously to the rise of private vehicle use, and subsequent pollution, is the level of subsidy which vehicle operators enjoy. "A full accounting of road building and maintenance, municipal services such as traffic regulation and costs borne by police and fire departments, accidents and related health care, and tax losses from land paved over for automotive purposes would reveal that car owners do not pay their fair share of costs borne by government so they can use their cars. Studies in the United States indicate that incorporating these costs into the price of gasoline would raise the price to $4.50 a gallon or $1.37 Canadian per litre" (Access to Transportation et al. 1990:5).

Of course it is not possible to eliminate, or even significantly change, overnight the structure we have developed and on which we have come to depend. Cars make sprawl possible, in turn making people completely reliant on their vehicles. There are some options, but these require that we think differently about why and what we are moving. Instead of thinking about going places, we should think about being places; that is, think in terms of establishing desirable places close to one another. Transportation is what you have to do to get to places that are inconveniently located, and the less unnecessary travel the better (Register 1987).

Kilcoyne (1990) suggests we need to change our orientation of traffic engineering from concern with moving vehicles to concern with moving people. For example, "many curbside bus stops force buses to pull out of ongoing traffic and then wait for a gap to pull back in. Eliminating these would force those in cars to wait behind the bus — giving priority to people in the bus rather than the car" (Kilcoyne 1990:45).

The Toronto Transit Commission (TTC) has called for sweeping changes to Toronto's parking rules, traffic signals, and road lanes to give public transit vehicles the edge over private cars. A clearway program restricting curb lanes on Bay Street, one of the city's busiest arteries, to TTC trolleys, bicycles, taxis, and emergency vehicles from 7 a.m. to 7 p.m. has been working successfully since October 1990 (Howell 1991).

While Alberta does not have the large, densely populated cities characteristic of much of the United States and eastern Canada, our population continues to grow. Realistically, some of the solutions now being considered or adopted in larger urban places may not be directly transferable to Alberta, at least not on the same scale. Nevertheless, through visionary planning and anticipation of the long-term needs of our communities, we can be proactive and perhaps avoid the serious and expensive problems faced by other communities who now find their choices limited.

When faced with the difficult task of changing the way we traditionally do business and make decisions, it is important for municipalities to play several roles. They must show vision and leadership in planning for a future that considers the present and expected needs of their citizens; they must lead by example; and they must provide opportunities for their citizens to have meaningful input into planning and implementing this vision. Each community is different, with its own unique circumstances and needs; identifying these transportation needs in the context of where the community wants to be in the future, then finding ways to meet these needs is becoming an urgent challenge.

City councils in Toronto and Vancouver have shown leadership in these issues by establishing special advisory bodies to research some of these topics and make appropriate recommendations. In January 1990, Toronto City Council accepted a series of recommendations from its Special Advisory Committee on the Environment. One major recommendation was that possible appropriate strategies to prevent and control urban sprawl in the Metro Toronto area be examined. Council also endorsed in principle a number of other recommendations, and strategies for implementation will be considered in various areas:

- the City will examine its use of small vehicles to try and reduce their number and the need for them;
- companies in the downtown area will be contacted and asked to take steps to reduce the use of cars for commuting to work;

- the City Cycling Committee will be asked to develop ambitious recommendations for bicycle lanes and the promotion of winter cycling; and
- the city's parking rates will be examined with consideration of an increase to bring them in line with private rates, with the revenues used to reduce the consequences of automobile traffic.

The Special Advisory Committee also made recommendations in other areas related to energy use and urban forestry.

Bicycles are growing in popularity, especially with the advent of mountain bikes, which permit year round cycling in many parts of Canada. As roads become more congested, cycling becomes an increasingly attractive option, especially in good weather. Traffic counts in the City of Toronto show that bicycle traffic volume is increasing much faster than other traffic volumes. From 1975 to 1985, bikes increased by nearly 300 percent as opposed to 39 percent for vehicles (Hough and Barrett 1989). Bicycle commuters have different needs than recreational cyclists, and municipalities should take more care to identify and meet these needs. Secure parking for bicycles and bike lanes of adequate size and with proper markings, are two ways municipalities could encourage cycling as an alternative to driving. On a trial basis, the City of Edmonton is allowing cyclists to bring their bikes onto the LRT during off-peak hours and the move has been well accepted to date (Journal Staff, March 15, 1991).

Other public policies in support of bicycles such as bike-and-ride programs, whereby cyclists can take their bikes to a public transit station, park them securely, and board a subway, bus, or rail car, can be a very effective approach to reducing emissions. (Lowe (1989) examines in more detail the potential of the bicycle to contribute to a cleaner environment.) In Winnipeg, an environmental group has launched a plan whereby it hopes to make some 2000 bikes available at racks throughout the city for people to ride and then leave at another rack at their destination. A similar successful program has been running in Amsterdam for some time (Canadian Press, Jan. 30, 1991).

Traditionally, efforts to reduce vehicle emissions have focused on new-vehicle efficiencies. As necessary as they are, they will not be enough to significantly reduce CO_2 emissions from the transportation sector if present growth trends in vehicle numbers and use continue. "A successful emissions-reduction strategy will also have to be grounded in overall efficiency improvements in transportation systems and, in the longer term, fundamental changes in the energy sources used in transportation. A broad spectrum of measures is needed to reduce emissions. These include reducing congestion, keeping highway speeds down, increasing capacity factors in all types of vehicles, and slowing the growth in vehicle miles travelled" (MacKenzie and Walsh 1990:38). In urban centers there are many options to improve transportation efficiency, including the installation of synchronized traffic lights and reduction of on-street parking to maximize lane use.

Rural areas have fewer options when it comes to moving people and goods because of the distances involved and the low population density. In these areas, allocating land for parking can be one of the most complicated issues related to transportation. For example, is it better to spread out and use more land for parking, or to build a parkade? Small towns often have height restrictions which limit the size a parkade could be, and communities that are built on flood plains have restrictions on building underground.

The extensive use of private vehicles in a climate such as ours, means that there are associated environmental impacts apart from emissions and land-use planning, such as water quality problems resulting from the use of road de-icing salt. Strategies for efficient energy use for block heaters are well known, and communities are just now beginning to explore alternatives to road de-icing salt.

Chapter Four

Water

- *retrofits*
- *leak detection and repair*
- *low-flow showerheads*
- *toilet dams*
- *sink aerators*
- *water audits*
- *water meters*
- *pricing*
- *water-use workshops*
- *runoff and stormwater management*
- *wastewater irrigation projects*
- *alternatives to toxic garden chemicals*

Water issues are traditionally viewed in two parts: quantity and quality. Apart from public information programs to discourage homeowners, businesses, and industry from using the sewage system to dispose of toxic and hazardous materials, most of the approaches to improving water quality at a municipal level are very expensive.

Impacts on water quantity are different. Canadians as a whole are among the world's greatest per capita consumers of water. As with energy, traditional approaches to water management have focused on augmenting supply rather than trying to reduce demand. (As Garrett Hardin phrases it, we have a longage of demand, not a shortage of supply (1985).) While this approach might solve the immediate problem, it does not address the underlying reasons for the problem — which have to do with our attitudes and the way we use water. Furthermore, these engineering solutions have high costs, many of which are subsidized by government, which reinforces the undervaluation of water.

Water Conservation

Water conservation programs have benefits for both individual homeowners and for the community as a whole. Consumers save money by using less water (assuming their supply is metered) and their hot water requirements are reduced. Estimates are that individual homeowners can save about ten dollars per month and reduce their water consumption by 30 to 50 percent simply by using low-flow showerheads, toilet dams, and sink aerators (Environment Canada n.d.). This reduction in consumption has significant implications for municipalities, especially during dry summer months. The other area of greatest municipal impact is in water treatment demands: reduced

water consumption means that a smaller volume of water will require subsequent treatment and purification. This in turn reduces the need to expand municipal treatment facilities, deferring or even eliminating costly capital expenditures.

The use of water conserving devices also brings benefits in rural areas where residents rely on individual water supplies and septic systems. Where water supplies are marginal or septic tank problems occur, water conservation can alleviate problems such as dry wells and septic tank overflows.

Only five percent of the water consumed in Canadian homes is actually used for drinking and cooking — most of the rest literally goes down the drain after we bathe, do laundry, wash dishes, flush the toilet, and so on (Environment Canada 1990). Most North American toilets, for example, are built with 20-litre tanks; those in Germany use about 9 litres per flush, while since 1975, Scandinavian countries have routinely installed toilets requiring as little as 6 litres (Keating 1986).

Only five percent of the water consumed in Canadian homes is actually used for drinking and cooking — most of the rest literally goes down the drain after we bathe, do laundry, wash dishes, flush the toilet, and so on.

Municipalities can encourage or require water conservation devices to be installed as a matter of course in any new buildings, as part of the building permit. Kitchener, Ontario has made it a civic policy to have new homes built with water-saving devices (Keating 1986).

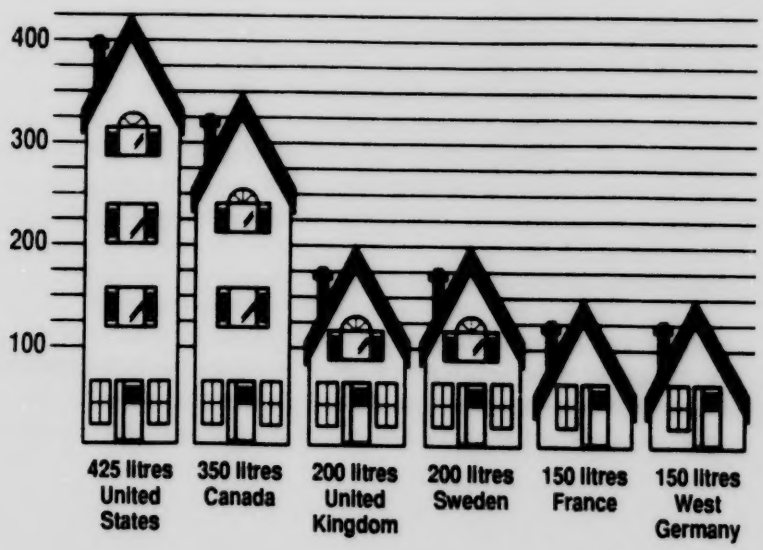
Metering of water is an obvious conservation technique. In Edmonton all residential water users are metered, while Calgary is only partially metered. Metered users in both cities use about the same amount while unmetered households in Calgary use about 50 percent more water. Furthermore, it is no coincidence that residents of Canada and the U.S., who generally have the lowest water prices, are also the world's most profligate water consumers (Fig. 2-3). Those in western Germany paid about three times as much as Canadians in 1989 for 1000 litres of water, and used just over one-third the amount (Environment Canada 1990). Water-pricing practices in Canada are extraordinarily diverse, and average monthly prices to customers vary a great deal. Tate (1989) suggested that this disparity could be accounted for by the fact that currently "it appears that acceptability to local ratepayers is the most important factor in rate setting" (p. 9).

In 1982, the Town of Hanna, Alberta, with technical assistance from the Palliser Regional Planning Commission, undertook a water

Figure 2: Typical municipal water prices

($/1000 litres*) * All amounts are 1989 Canadian dollars.
These figures do not include the cost of waste treatment.

Figure 3: Average daily household water use (per capita)



Source: Adapted from Environment Canada 1990

conservation pilot project with the intention of achieving a 20- to 30-percent reduction in water use in the test buildings. The eight homes and two offices involved in the study were retrofitted with water-saving devices for toilets, showers, and faucets, and assessed during July and August 1982. Average water reduction was 31 percent per building, and reached 45 percent in the household in which daily records were kept (Palliser Regional Planning Commission 1982).

A demonstration project to test a water and energy conservation program was launched in Middleton, a fairly small community in Nova Scotia, in 1989. Many aspects of this program were similar to the one described for Hanna. Environment Canada was a major sponsor of the project through its Environmental Partners program. The local council voted unanimously to support and participate in the project, which involved residents and other levels of government, as well as the Nova Scotia Power Corporation and nongovernment organizations. Community workshops and awareness campaigns were important events that took place early in the project, followed by distribution of water saving kits containing a low-flow showerhead, sink aerator, and toilet dam. Energy saving equipment was also distributed by the power company. The awareness program focused on passive techniques which require changes in behavior, mainly reducing nonessential water consuming activities such as lawn and garden watering and car washing. Water and energy use will be monitored in the community for one year, and results are expected to be known in 1992.

The awareness program focused on passive techniques which require changes in behavior, mainly reducing nonessential water consuming activities such as lawn and garden watering and car washing.

The City of Edmonton has allocated some $300,000 for a pilot project to increase awareness and help people realize that saving water can also save them money. Four thousand households, in three test groups, are involved. One group will have water conservation devices installed at no charge to them. The second group will be provided with the kit but will have to do their own retrofitting. The third group will be given information on water conservation and advised as to where they can purchase the kit. A control group will simply be given the information (McKeen, March 8 and 12, 1991).

A number of municipalities have produced pamphlets or brochures on water conservation for homeowners, and distributed the information separately or with utility bills. The City of Regina has a booklet of tips called *Water Works* and the Regional Municipality of

Waterloo, Water Conservation Program sponsored a publication entitled *Healthy Lawns and Gardens with Less Water.*

The Seattle Water Department offers a water conservation program that, from year to year, features demonstration sites ranging from drip irrigation to water-efficient gardening to scheduling irrigation times based upon the weekly climate (Kour 1990).

The State of Arizona has chronic problems matching water supply and demand, and is aggressively using a variety of means to reduce demand. The Arizona Municipal Water Users Association, which includes the cities of Chandler, Glendale, Goodyear, Gilbert, Mesa, Peoria, Phoenix, Tempe, and Scottsdale, has implemented activities in several categories, among them: ordinances and other regulatory approaches; incentive programs; water audit programs; retrofit programs; water rates that discourage consumption; industrial/commercial conservation; conservation education; leak detection and repair; research and data collection; and adjustment of internal city programs to conserve water. Incentives include rebate programs for customers who retrofit with low water consumption toilets and who have low-water-use landscaping. Water audits have been conducted on a cost-share basis with some commercial and industrial users. Water conservation retrofit kits have been distributed to many households along with dye tablets to check for leaks. Several cities have adopted water rate structures to encourage conservation. The City of Scottsdale plans to require all commercial and industrial accounts using more than five acre-feet of water per year to submit a water conservation plan, requiring the use of best available technology if that technology is cost effective. Multi-family and planned communities using more than five acre-feet will be subject to the same requirements. School programs are a large part of the conservation education program, using various techniques to stress the importance of water conservation to children.

School programs are a large part of conservation education programs, using various techniques to stress the importance of water conservation to children.

California has also experienced problems with water demands, and determined that controlling loss of water through leaks can be an effective conservation measure and also save the municipality money. Such leaks occur after the water has been treated and pressurized, but before it reaches the paying consumer. The California Department of Water Resources estimated that about 250,000 acre-feet of water

annually leak from municipal systems in that state. The Department's experience with 60 local water agencies indicated that leaking water can be controlled at a cost averaging less than $50 per acre-foot, a cost usually less than what a water agency pays for the water. The state has published a series of how-to guidebooks, including one entitled *Water Audit and Leak Detection Guidebook*.

Most municipalities would agree that information and awareness are key elements in conservation programs, and several agencies other than municipal governments have prepared handbooks for designing a local water conservation plan (American Water Works Association 1984; State of California 1984).

Drainage

Whenever the natural ground cover is removed, runoff and drainage patterns will be altered. Road construction and paving, buildings, driveway and sidewalk installation, parking lots, tree-felling, breaking of native grasslands, and so on all change the way water moves in an area. The impacts are seen differently in rural areas than in urban places, but the outcome is the same — the runoff must be managed so as to avoid flooding and other damage such as erosion.

With respect to urban municipalities, a survey of drainage practices across Canada showed that municipalities tend to see quantity as their business and quality as the responsibility of higher levels of government.

In rural areas, much of the road work is done through the province. Further, the concentration of people and the subsequent impact on drainage patterns is less than in urban areas, and the role of municipal government is less clear.

Rural municipalities can play an important role in ensuring that drainage projects are compatible with conservation goals. For example, the Municipal District of Starland, Number 47, in southeast Alberta, has an explicit policy regarding water management and erosion control programs whose costs are shared with the province. There must be a preproject inspection by at least one municipal representative, a representative from Water Resources Administration in Alberta Environment, a representative from Ducks Unlimited, and the landowner(s). Only if the project meets the conservation goals of the municipality and would benefit agriculture, are the request and consent forms submitted to council.

In urban areas that are completely paved or roofed, it has been estimated that runoff might constitute 85 percent of the precipitation with only 15 percent being intercepted (Kull and Sopper 1969; cited in Hough 1989:71). Few places are completely paved or roofed, of course, but the implications for stormwater management are enormous.

With respect to urban municipalities, a survey of drainage practices across Canada showed that municipalities tend to see quantity as their business and quality as the responsibility of higher levels of government. There is also a failure to grasp fully the hidden environmental and economic costs of local practices, such as connecting downspouts to the sewer rather than discharging roof water directly to the ground (Lang and Armour 1980; cited in Hough 1989:77-78). This water could be put to good use by diverting it onto trees, shrubs, bushes, or into the grass, so that what is not taken up by plants will eventually find its way into the groundwater. Not only does this reduce the need to water lawns and gardens (with what would be more expensive, treated water), it also reduces the volume of water entering treatment facilities. While this practice no longer occurs in new home construction in Alberta, there are undoubtedly many older houses where the connection is still in place.

The approach of creating ponds and lakes as part of a stormwater management system is used in many communities in Alberta. Calgary is now examining the idea of using three sloughs outside the city limits as catchment for runoff. Due to a combination of factors, these sloughs, covering about 400 hectares in total, have essentially dried up. Directing this runoff would result in wetland reestablishment while solving an otherwise costly infrastructure problem for Calgary. This is still in the early stages as additional studies are required to develop the concepts (Deong 1991; pers. comm.).

Some thought needs to be given as to where snow stockpiles are located; we should ensure that they do not drain into a water supply downstream.

Communities that clear snow from their streets often stockpile it to melt in the spring. Snow-clearing operations also collect a variety of debris from the streets, including pet droppings, road salt, and other materials. If the snow is stored on river ice or adjacent to a river, these materials will find their way into the surface water. There may be particular cause for concern if the same river serves as a source of drinking water. Some thought needs to be given as to where these stockpiles are located; we should ensure that they do not drain into a

water supply downstream. Relocating these sites can be expensive but Edmonton did it recently at a cost of about $500,000, including a proper drainage and filtration system.

Wastewater

The practice of discharging treated water back into a watercourse continues in many municipalities. However, Alberta Environment, in collaboration with municipalities, has developed a number of wastewater irrigation projects. There are currently 14 permanent wastewater irrigation systems discharging onto agricultural land in Alberta, four systems going onto golf courses, and four discharging onto school playgrounds and ball parks. Furthermore, in southern Alberta, Pincher Creek, Taber, and Strathmore all have systems in place for wastewater irrigation, which are completely owned by the municipality (Spink 1991; pers. comm.). Alberta Environment continues to encourage municipalities to consider wastewater irrigation, even in northern Alberta; for example, a possible forestry irrigation project is currently being considered in the Lac La Biche area.

Sanitary sewage sludge is also land-applied in a number of Alberta municipalities, with the result that about 65 percent of sewage sludge from municipal waste treatment plants ends up on agricultural land. All the sludge from Edmonton and Calgary is applied to farmland, and it is estimated that approximately ten sections of land in Alberta receive sewage sludge each year. Smaller communities such as Bentley, which have lagoon systems, also land-apply their sludge, but much less acreage is required (Spink 1991; pers. comm.).

Studies at Pennylvania State University have shown that, given the right soil types, agricultural crop yields are usually increased as a result of wastewater application. Penn State research has also indicated that forested land can be an effective filter, providing advanced treatment of sewage effluent by natural biological and chemical processes (Hough 1989). Growing forests can also benefit from the application of nutrients found in wastewater.

Collaborative work at Frank Lake in southern Alberta illustrates what can be done by municipalities working with other agencies, in this case Ducks Unlimited, Cargill, and Alberta Environment, to restore

a nearly dead wetland through an innovative approach to wastewater management. The decision was made to build a ten-mile pipeline to take treated wastewater from the Cargill plant and the town of High River to Frank Lake. The Town of High River, the Town of Okotoks, and the Municipal District of Foothills have been involved in the project which is expected to yield some 3,000 acres of wetlands (ACS Update, April 1989).

Water Quality

One of the things Alberta municipalities can do that is effective and relatively inexpensive is to participate in an annual toxic round-up. Communities around the province are working with the Alberta Special Waste Management Corporation, and various environmental nongovernment organizations to sponsor these events. Toxic round-ups provide residents with an opportunity to responsibly dispose of old paints, garden chemicals, household cleaners, antifreeze, drugs, and other hazardous materials. The benefits derived from participating in these programs include greater public awareness which results in toxic materials being disposed of properly rather than simply flushing them down the toilet or pouring them down a sewer. Public participation continues to increase, especially when these events are held as part of larger events such as Environment Week.

Better yet, municipalities can encourage people to decrease their use of toxic household and garden chemicals by providing accurate information on safer alternatives. Again this can be done through collaboration with environmental groups. The City of Edmonton, for example, has participated with the Board of Health and the Environmental Resource Centre in holding community workshops on waste and energy audits, alternatives to chemicals, and other topics. Many municipalities are also working with other groups and organizations to raise awareness and sponsor projects during events such as Environment Week.

Chapter Five

Municipal Operations

- ***local environmental advisory bodies***
- ***healthy public policy***
- ***heritage preservation***
- ***procurement policies***

While local governments can exhort their citizens to be environmentally responsible, the words won't ring true unless a good example is set. Municipalities can demonstrate sound leadership and vision by incorporating environmentally sound decision-making processes into their day-to-day operations. In this age of mobile, footloose, and franchise businesses, those communities with a clean, healthy environment will have a definite advantage in attracting enterprise and entrepreneurs.

Local government plays several roles, all of which have the potential to reflect a green philosophy and set the tone for others: local government is a maker of policies and laws, it is a purchaser of goods and services, and it is an employer. Each of these roles conveys a message about the priorities and direction in which the municipality wants to go.

Municipalities can also play an important role in collecting and interpreting data relevant to their physical environment. They can identify areas that are environmentally sensitive; integrate conservation practices across the landscape; and establish a network of protected areas. Of course collaboration and consultation with other agencies and levels of government may be needed to ensure success. The Municipal District of Starland, along with Alberta Forestry, Lands and Wildlife and the Palliser Regional Planning Commission, recently published a report entitled *Environmentally Significant Areas in the Palliser Region*. The document provides an overview of these areas, an evaluation of them, principles to guide their management, and identifies areas for future research (Cottonwood Consultants Ltd. 1991).

One route that more and more municipalities are taking is to establish an environmental advisory body to the municipal council. To date, these task forces or committees generally comprise a variety of citizens from many walks of life, business and industry leaders, and sometimes elected council members and administrative staff. Committees in Peterborough and Toronto (Ontario) have been very effective and wide-ranging in their advice to council. In Alberta, such advisory bodies exist in Edmonton, Red Deer, Drayton Valley, Grande Prairie, and likely in a number of other municipalities. Their mandates vary, but, so far, most seem to be working well.

Although such advisory bodies are up and running in many places, this does not preclude the need to involve the public in environment and development decisions. Indeed, one of the biggest municipal challenges of the 1990s is likely to be reconciling individual rights with the greater public good. Expansion of light rail transit through an established neighborhood, locating a new landfill site, managing open spaces — these are all contentious local issues with no easy and obvious solutions. Ensuring that all participants in the process have access to the same, hopefully accurate, information, giving them a chance to present their views in a meaningful way, and trying to find a win-win solution is the best local government can hope to do.

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Policy

Local government makes policy decisions in many areas, some of which have already been mentioned: transportation, maintenance and protection of open spaces, tree planting, water conservation, waste management, and others. As this policy direction is determined, subsequent plans can begin to incorporate and implement these policies. Even things as simple as the way snow is cleared off streets, making great mounds for pedestrians to climb over, influence individual decisions that can affect the environment. For example, when plows leave three-feet high piles of snow at the end of sidewalks, it makes pedestrians think twice about the effort needed to scramble over them; and these snowbanks can influence the choice to use a vehicle rather than walk. Local government, through its policies, can reinforce individual decisions to act in an environmentally responsible

manner by making the choice for travel by foot or public transit easier. The extremely high participation rate in curbside recycling programs indicates that people will do the environmentally correct thing if the institutional support for that behavior is present.

The whole issue of waste management is a complicated one and there can be many spinoff effects if it is done properly; one of these is heritage preservation. While about 16 percent of all landfill waste is from the construction industry, only 2 to 3 percent is generated by new home construction — a far larger portion comes from demolition (Anderson 1990). The combination of increased tipping fees, rapidly diminishing space in landfills, and pressure from people who appreciate the craftsmanship of a bygone era may lead to the preservation and restoration of old buildings. If restoration or relocation is not possible, then municipalities can encourage salvage operations from buildings prior to their destruction. Recent experience in Edmonton in which houses were demolished for transit development, revealed the enormous public interest in salvaging materials that would otherwise add to an already substantial landfill burden (Howell D., April 24 - 25, 1991).

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Restoring older neighborhoods and historic areas of our communities provides many direct benefits in the form of pleasant streetscapes and diverse surroundings. When the surroundings and the built environment are attractive, people are more likely to want to be there — to walk, socialize, recreate, and even work within the community without needing a vehicle to get away and achieve a sense of freedom. While many parts of Alberta's two largest cities are intimidating and rather cold, there are parts that are intimate and warm — the Old Strathcona area in Edmonton; Louise Crossing and 17th Avenue in Calgary come to mind. Other communities such as Fort Macleod have taken advantage of the Heritage Canada program to revitalize and restore their downtown to help make them places where people want to be.

On a broader policy scale, the Municipality of Sudbury (Ontario) has decided to shift from mega projects which are difficult to launch and difficult to sustain, to micro projects that use available resources, are sustainable, and generally less risky (City of Sudbury 1987). An example of an integrated, anticipatory policy can be found in Saskatoon

where the transit manager has a right of veto over any subdivision design (Xepic 1985); this ensures that prospective residents will be adequately and properly served by public transit services.

Many U.S. cities have instituted a variety of policies that reflect their environmental concerns. For example, over 60 cities have adopted policies that give preference to the purchase of recycled materials; the use of greywater is permitted on landscaping; there are economic development policies that encourage businesses to hire residents of the community in which they are located (Skinner 1990). Davis, California has instituted a growth control regulation which involves a point system and a limit on the number of building permits. "Before approving each home, city officials ask for a range of extras from developers, for example, a diversity of designs, a good supply of less expensive homes, a minimum of environmental damage, creation of open areas, and help with additional city service cost. Those who accumulate the most points on these extras are first in line for building permits" (City of Vancouver 1990:15).

A number of states are also requiring localities to enact environmental legislation, and citizens in many communities are supporting such ordinances. Much of this is being incorporated into zoning codes and is expected to have a significant impact on new development. These are discussed in more detail by Reed (1989) in his *Checklist of Environmental and Natural Resources Provisions to be Included in Zoning Codes.*

The City of Edmonton has a large number of environmental initiatives underway, many of which arose from recommendations by the Environmental Task Force. These range from double-sided photocopying to electronic mail and changes in the management and maintenance of city vehicles. Edmonton also has a right-to-know policy with respect to chemical spraying in the city; this requires the posting of signs prior to and following the spraying of any municipal property in the city to alert people to the chemical being used and when it was applied.

Procurement

Municipal government spends billions of dollars annually purchasing products from a variety of suppliers in Canada. The City of Edmonton alone spent $421 million in 1990 purchasing some 250,000 different items (McKeen, Feb. 24, 1991). Spending these funds on products that are least harmful to the environment is another route many local governments are taking. While some products, such as recycled paper, energy-efficient light bulbs, and other so-called environmentally friendly items started out to be more costly, a demonstrated consumer demand for them has brought prices down. A coalition of Canadian municipalities (including Edmonton, Calgary, Winnipeg, Toronto, and Regina) has been formed to draw up specifications for products so that the marketplace can respond to this interest and demand (McKeen, Feb. 24, 1991).

In the 1980s, the City of Dartmouth, Nova Scotia looked at product assessment and acquisition, especially with respect to CFCs. By 1989, with assistance from the federal and provincial consumer affairs departments, and the belief in their need to set an example, the city had a policy to replace all products containing CFCs, where alternatives were available (Savage 1989).

The Municipality as Employer

It is difficult to determine what strides municipalities have taken to show environmental leadership as employers, but the range of things that could be done is large. Making it easy for employees to act in an environmentally responsible manner could include actions such as providing shower facilities and secure parking for bicycles so that those who wish to jog or cycle to work can do so; implementing staggered work hours to ease traffic congestion; taking advantage of sophisticated electronics to allow employees who are able to do so and who wish to, to work at home on a part-time basis; abolishing parking perks or making equivalent public transit perks available; offering prizes or rewards as encouragement for staff to suggest better ideas that are environmentally sound.

Chapter Six

Conclusion

It seems, in the 1990s, that we may be rediscovering the attachment we have to the place where we live. It is safe to say that most adult Albertans came here from some place else, mostly by choice, and with the hope and expectation of a better life. The community is an important part of this better life and municipal government can play a big part in making a better life a reality. When it comes to meeting our most basic day-to-day needs, local institutions are crucial, and citizens often go first to local authorities when requiring assistance in all manner of problems.

Many things are happening at the local level which are complementary and together will surely help us influence what we are becoming. The healthy communities concept, a plethora of community groups working on diverse issues that affect the larger town or city as well as their immediate neighborhood, and groups that have formed to celebrate events such as Environment Week exemplify growing public concern over the environment. Municipal officials can look at these activities and smile because all of them will contribute to a better life. But as this paper shows, municipalities can do more: they can focus on those things which only they can make happen; they can support the work others are doing; and if things are working well, leave them alone. In short, municipalities can lead, follow, or get out of the way.

One thing is certain: if we don't begin to balance our account with the environment, we, or more precisely our children, will be in trouble. We already know what our problems are and in many cases we have some good ideas about how to solve them. All that's needed is action. A sustainable future requires innovation and action now, and municipalities can lead the way.

References

Access to Transportation in Our Neighborhoods, Environmentalists Plan Transportation, Friends of the Earth, Greenpeace, Pollution Probe, Transport 2000. 1990. *Greening Ontario's Transportation: A Public Campaign.* Toronto: Author.

Agriculture Canada and Alberta Agriculture. 1990. *Canada-Alberta Soil Conservation Initiative: Annual Report 1989-1990.* Edmonton: Author.

Alberta Treasury. 1990. *Alberta Facts '90.* Edmonton: Alberta Treasury, Bureau of Statistics.

American Water Works Association (AWWA). 1984. *Before the Well Runs Dry.* Volume I – A Handbook for Designing a Local Water Conservation Plan. Denver, CO: Author.

Anderson, D. 1990. Heritage preservation and garbage crisis. *Impact,* July: 1-2.

Anderson, L.M. and H.K. Cordell. 1985. Residential property values improved by landscaping with trees. *Southern Journal of Applied Forestry* 9(3):162-166.

Brannon, E.B. jr. 1988. The value of shade in Kalispell, Montana. *Western Wildlands* 14(1):17-19.

Brule, L. 1986. Urban agriculture. *Probe Post* 9(3):26-29.

Canadian Press. 1991. Bicycles will be there for the taking: Winnipeg environmentalists putting out bikes that anyone can use. *Edmonton Journal, 30 January.*

City of Kalispell. 1986. *Ordinance No. 1086, City of Kalispell Tree Ordinance.* Kalispell, Montana: Author.

City of Sudbury. 1987. *Planning for Sustainable Development — The Sudbury Case.* Strategic/Corporate Plan of/by/for the City of Sudbury. Sudbury: Author.

City of Toronto Special Advisory Committee on the Environment. 1989. *The Changing Atmosphere: A Call to Action.* Report Number One. Toronto: City of Toronto.

City of Vancouver Task Force on Atmospheric Change. 1990. *Clouds of Change: Vancouver and the Changing Atmosphere.* City of Vancouver Task Force Report. 7 March 1990. Vancouver: City of Vancouver.

Cottonwood Consultants Ltd. 1991. *Environmentally Significant Areas in the Palliser Region.* Morrin, Alberta: Municipal District of Starland No. 47.

Dorney, R. 1990. The ecological restoration and utilization of urban rights-of-way. Pages 119-131 in *Green Cities: Ecologically Sound Approaches to Urban Space.* D. Gordon, ed. Montreal: Black Rose Books.

Environment Canada. n.d. *Middleton Water/Energy Conservation Project.* Dartmouth, NS: Environment Canada, Atlantic Region.

Environment Canada. 1990. *Water Works!* Fact Sheet No. 4. Ottawa: Minister of Supply and Services.

Environment Council of Alberta. 1989. Processing plant to create wetland — a win-win solution in southern Alberta. *ACS Update, April: 2.*

Gilkeson, L. 1990. Integrated pest management. Pages 159-168 in *Green Cities: Ecologically Sound Approaches to Urban Space.* D. Gordon, ed. Montreal: Black Rose Books.

Goldstein, J. 1977. *Sensible Sludge.* Emmaus, PA: Rodale Press.

Granger, W. 1990. Naturalizing existing parklands. Pages 99-111 in *Green Cities: Ecologically Sound Approaches to Urban Space.* D. Gordon, ed. Montreal: Black Rose Books.

Journal Staff. 1991. LRT opens train doors to cyclists. *Edmonton Journal,* 15 March.

Hardin, G. 1985. *Filters Against Folly.* New York: Penguin.

Hayes, D. 1990. Earth day and beyond: rebuilding the environmental movement. Pages 6-7 in *Urban Ecology: Report of the First International Ecocity Conference*. C. Canfield, ed. 29 March – 1 April, 1990. Berkeley, CA: Urban Ecology Inc.

Hiss, T. 1990. *The Experience of Place*. New York: Alfred A. Knopf.

Hiss, T. 1991. The wild side of Portland. *House and Garden*. May: 166-169.

Hook, J. 1990. San Luis Obispo Creek restoration. Page 64 in *Urban Ecology: Report of the First International Ecocity Conference*. C. Canfield. ed. 29 March – 1 April 1990. Berkeley, CA: Urban Ecology Inc.

Hough, M. 1989. *City Form and Natural Process*. New York: Rutledge.

Hough, M. and S. Barrett. 1987. *People and City Landscapes: A Study of People and Open Space in Metropolitan Areas of Ontario*. Toronto: Conservation Council of Ontario.

Howell, D. 1991. Deck lifted from wrong residence: scavengers flock to house demolition site. *Edmonton Journal*, 25 April.

Howell, D. 1991. Houses to be demolished now free for the taking. *Edmonton Journal*, 24 April.

Howell, P. 1991. TTC seeks supremacy of buses over cars. *Toronto Star*, 2 April.

Keating, M. 1986. *To the Last Drop: Canada and The World's Water Crisis*. Toronto: MacMillan of Canada.

Kilcoyne, R. 1990. Auto disincentives, transit incentives. Pages 45-46 in *Urban Ecology: Report of the First International Ecocity Conference*. C. Canfield, ed. 29 March – 1 April 1990. Berkeley, CA: Urban Ecology Inc.

Kour, R. 1990. "What's so great about Seattle?" *Garbage, November/December: 24-30.*

Lang, R. and A. Armour. 1989. *Environmental Planning Resource Book*. Montreal: Lands Directorate, Environment Canada.

Lowe, M.D. 1989. *The Bicycle: Vehicle for a Small Planet*. Worldwatch P[illegible]r 90. Washington, DC: Worldwatch Institute.

Lull, H.W. and W.E. Sopper. 1969. Hydrologic effects from urbanization of forested watersheds in the NE. Forest Service Research Paper No. 146. Washington, DC: United States Department of Agriculture.

MacKenzie, J.J. and M.P. Walsh. 1990. *Driving Forces: Motor Vehicle Trends and Their Implications for Global Warming, Energy Strategies, and Transportation Planning*. Washington, DC: World Resources Institute.

McRae, D. 1991. South Peace Regional Planning Commission Report. *Newsletter of the Alberta Association, Canadian Institute of Planners*. Spring: 12.

McKeen, S. 1991. City looks to turn tide in water waste. *Edmonton Journal*, 8 and 12 March.

McKeen, S. 1991. Green policy makes city a careful shopper. *Edmonton Journal*, 24 February.

Palliser Regional Planning Commission. 1982. *Hanna's Water Conservation Pilot Project: Pretest-Stage Findings*. Hanna, Alberta: Author.

Register, R. 1987. What is an ecocity? *Earth Island Journal*, Fall: 31-33.

Reed, C. 1989. Checklist of environmental and natural resources provisions to be included in zoning codes. (3 parts) in *The Zoning Report* 7 (14), 8 (1), 8 (2).

Reid, R.G. 1988. Urban forestry: a look at the worth of trees. *Western Wildlands* 14(1):9-13.

Renner, M. 1988. Rethinking the Role of the Automobile. Worldwatch Paper 84. Washington, DC: Worldwatch Institute.

Savage, J. 1989. *Healthy Communities*. Presentation to Urban Environment Sub-Committee of the Public Advisory Committees to the Environment Council of Alberta, Edmonton, Alberta, 18 April 1989.

Skinner, N. 1990. Ecocity legislation. Pages 85-86. in *Urban Ecology: Report of the First International Ecocity Conference*. C. Canfield, ed. 19 March – 1 April 1990. Berkeley, CA: Urban Ecology Inc.

Solway, J. 1990. *Reflections On Sustainable Planning*. Ottawa: The Canadian Institute of Planners.

State of California; The Resources Agency. 1984. *Designing a Public Information Program for Water Conservation*. Sacramento, CA: California Department of Water Resources.

State of California; The Resources Agency. 1986. *Water Audit and Leak Detection Guidebook*. Sacramento, CA: California Department of Water Conservation, California-Nevada Section.

Steffans, C. 1990. The Texas Highways Department wildflower program. Pages 134-143 in *Green Cities: Ecologically Sound Approaches to Urban Space*. D. Gordon, ed. Montreal: Black Rose Books.

Tate, D.M. 1989. *Municipal Water Rates in Canada; 1986 — Current Practices and Prices*. Social Science Series No. 21. Ottawa: Inland Waters Directorate, Water Planning and Management Branch.

Tuholske, L. 1988. Missoula, Montana: greening the garden city, and forests in the city: the Montana experience. *Western Wildlands* 14(1):14-16.

Tyler, M.E. 1990. Urban Ecology. Notes from seminar sponsored by City of Edmonton Parks and Recreation Department and Alberta Association of Landscape Architects. Edmonton. 19 October 1990.

Urban Environment Sub-Committee, Public Advisory Committees to the Environment Council of Alberta. 1988. *Environment By Design: The Urban Place in Alberta*. ECA88-PA/CS-S3. Edmonton: Environment Council of Alberta.

Walkowiak, J. 1988. Community forestry in eastern Montana. *Western Wildlands* 14(1):19-21.

Wight, I. 1990. Strategic planning and Alberta's municipalities. *Western Planner* 11(5):10-14.

World Commission on Environment and Development (WCED). 1987. *Our Common Future*. WCED. Oxford, NY: Oxford University Press.

Xepic, Z. 1985. Winter cities: restructuring the transportation — land-use relationship. Pages 67-78 in *Reshaping Winter Cities: Concepts, Strategies and Trends*. N. Pressman, ed. Waterloo: University of Waterloo Press.

Personal Communications

Baker, M. Director, Parks and Recreation, The City of Kalispell. 1991. Telephone Conversation. Kalispell, Montana.

Deong, Y. Senior Long-Range Design Engineer, Engineering and Environmental Services Department, The City of Calgary. 1991. Telephone Conversation. Calgary.

Nette, T. Wildlife Biologist, Fish and Wildlife Division, Alberta Forestry, Lands and Wildlife. 1991. Telephone Conversation. Calgary.

Spink, D. Branch Head, Standards and Approvals Division, Alberta Environment. 1991. Telephone Conversation. Edmonton.

Stanger, N. Councillor, M.D. of Starland No. 47. 1991. Correspondence. Morrin, Alberta.

Appendix

Publications

Berg, P., B. Magilavy, and S. Zuckerman. 1989. *A Green City Program for San Francisco Bay Area Cities and Towns.* San Francisco: Planet Drum Books.

Duaney, A. 1989. *Suburban Sprawl or Livable Neighborhoods?* Videotape (2 volumes). Folsum, CA: Author. (Available through the Alberta Municipal Affairs library.)

Gordon, D. ed. 1990. *Green Cities: Ecologically Sound Approaches to Urban Space.* Montreal: Black Rose Books.

National Association of Towns and Townships. 1989. *Why Waste a Second Chance? A Small Town Guide to Recycling.* Washington, DC: Author.

Township of Richmond, B.C. 1989. *A Compendium of Local Initiatives Contributing to Sustainable Development Objectives.* Richmond, BC: Policy Planning Section, Richmond Planning Department.

Van der Ryn, S. and P. Calthorpe. 1986. *Sustainable Communities — A New Design Synthesis for Cities, Suburbs and Towns.* San Francisco: Sierra Club Books.

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